



Red Hat Reference Architecture Series

Building highly efficient Red Hat Enterprise Virtualization 3.0 Infrastructure with Mellanox Interconnect

Reference Design

Eli Karpilovski
Manager, Cloud Market Development
Mellanox Technologies, Inc.

Itzik Brown
Sr. Engineer, Solution Integration
Mellanox Technologies, Inc.

Version 1.0

November 2012





1801 Varsity Drive™
Raleigh NC 27606-2072 USA
Phone: +1 919 754 3700
Phone: 888 733 4281
Fax: +1 919 754 3701
PO Box 13588
Research Triangle Park NC 27709 USA

Linux is a registered trademark of Linus Torvalds. Red Hat, Red Hat Enterprise Linux and the Red Hat "Shadowman" logo are registered trademarks of Red Hat, Inc. in the United States and other countries.

UNIX is a registered trademark of The Open Group.

Mellanox®, Mellanox logo are registered trademarks of Mellanox Technologies, Ltd.

UFM™ and Unified Fabric Manager™ are trademarks of Mellanox Technologies, Ltd. All other trademarks are property of their respective owners.

All other trademarks referenced herein are the property of their respective owners.

© 2012 by Red Hat, Inc. This material may be distributed only subject to the terms and conditions set forth in the Open Publication License, V1.0 or later (the latest version is presently available at <http://www.opencontent.org/openpub/>).

The information contained herein is subject to change without notice. Red Hat, Inc. shall not be liable for technical or editorial errors or omissions contained herein.

Distribution of modified versions of this document is prohibited without the explicit permission of Red Hat Inc.

Distribution of this work or derivative of this work in any standard (paper) book form for commercial purposes is prohibited unless prior permission is obtained from Red Hat Inc.

The GPG fingerprint of the security@redhat.com key is:
CA 20 86 86 2B D6 9D FC 65 F6 EC C4 21 91 80 CD DB 42 A6 0E

Send feedback to refarch-feedback@redhat.com



Table of Contents

1 Introduction.....	1
2 Getting Started.....	2
2.1 Basic Test Bed Configuration.....	2
2.2 Required Hardware.....	3
2.3 Required Software Packages.....	3
3 Software Installation and Basic Configuration.....	4
3.1 RHEV-M Installation (Host2-1).....	4
3.2 RHEV Host Installation (Host3).....	11
3.3 Mellanox OFED Driver Installation (All Hosts).....	14
3.4 Mellanox VSA Installation (Host4).....	16
3.5 Mellanox UFM Installation (Host1).....	18
3.6 Mellanox Network Manager Plugin.....	18
3.6.1 Installing Mellanox Network Manager Server.....	18
3.6.2 Installing Mellanox Network Client.....	18
4 RHEV Manager Configuration.....	19
4.1 Add Data-Center.....	19
4.2 Add Cluster.....	20
4.3 Add Host.....	21
4.4 Add Storage.....	22
4.5 Adding Virtual Machines to a Cluster.....	25
4.6 Add a Network to the Cluster.....	30
4.7 Add an Interface to VM.....	33
5 Using UFM to Automate Network Management.....	36
5.1 Basic UFM Configuration Flow.....	37
6 Mellanox Network Manager Plugin.....	41



7 Conclusion.....	41
Appendix A: Troubleshooting.....	42
A.1.1 Host is not Added to a Logical Server in UFM.....	42
A.1.2 Migration of VM Fails.....	42
A.1.3 Connection Verification of Virtual Machines Using eIPoIB.....	42
A.1.4 Low Latency Performance Tuning.....	43
Appendix B: Related Documentation.....	43



List of Figures

Figure 1: Basic Test Bed Scenario - Example.....	2
Figure 2: Red Hat Enterprise Linux Installation.....	4
Figure 3: Red Hat Enterprise Linux Installation.....	4
Figure 4: Red Hat Network - Register.....	5
Figure 5: RHEV-M Portal.....	10
Figure 6: Red Hat Enterprise Linux Installation.....	11
Figure 7: Red Hat Enterprise Linux Installation.....	11
Figure 8: Red Hat Network - Register.....	12
Figure 9: Using the ConnectX-3 adapter results in faster I/O traffic delivery rather than using multiple 10GbE ports.....	17
Figure 10: New Data Center.....	19
Figure 11: New Cluster.....	20
Figure 12: Data Center.....	20
Figure 13: Adding a Host.....	21
Figure 14: Installation in Progress.....	21
Figure 15: Installation Complete.....	22
Figure 16: Host is Up.....	22
Figure 17: Discovering Targets.....	23
Figure 18: Login to Target.....	23
Figure 19: Choosing an LUN.....	24
Figure 20: Successfully Adding a Storage Domain.....	24
Figure 21: Adding New Virtual Machine - General.....	25
Figure 22: Adding a New Virtual Machine - Console.....	26
Figure 23: Adding a New Virtual Machine - Host.....	26
Figure 24: Adding a New Virtual Machine – Boot Options.....	27



Figure 25: Adding a New Virtual Machine – Configuration.....	27
Figure 26: Adding a New Virtual Machine – Adding a New Network Interface.....	28
Figure 27: Adding a New Virtual Machine – Adding a New Virtual Disk.....	28
Figure 28: Adding a New Virtual Machine – Finishing Configuration.....	29
Figure 29: Adding a New Virtual Machine – VMs Screen.....	29
Figure 30: Adding a New Virtual Machine – VNC Screen.....	30
Figure 31: Logical Networks.....	30
Figure 32: Adding a New Logical Network.....	31
Figure 33: Added the New Logical Network.....	31
Figure 34: Adding a Network Interface to the Logical Network.....	32
Figure 35: Added the Network Interface to the Logical Network.....	33
Figure 36: Virtual Machine – Network Interfaces View.....	33
Figure 37: Adding a New Network Interface.....	34
Figure 38: Added the New Network Interface.....	34
Figure 39: Verifying the New HCA is Up.....	35
Figure 40: UFM Environment.....	37
Figure 41: New Logical Server.....	38
Figure 42: Add Hosts.....	38
Figure 43: Add Hosts.....	39
Figure 44: Connect the Logical Server to the Network.....	40
Figure 45: UFM Network Connected to the UFM Logical Server.....	40



Index of Tables

Table 1: Required Hardware.....	3
Table 2: List of Related Documents.....	43



1 Introduction

This reference design describes how to integrate and use Red Hat Enterprise Virtualization Manager (RHEV-M) to control a cloud based on:

- Servers with Red Hat OS and KVM
- Mellanox products for network connectivity and storage

Through significant customer engagements, building data centers, and working closely with IaaS architects and administrators, Mellanox in collaboration with Red Hat formed a new Cloud-X architecture which enables an integrated computing, network and storage technology cloud solution. Through intelligent discovery, awareness and automation, the new joint solution provides the highest levels of virtualization and application performance.

The new collaboration is designed to deliver a high-performance and efficient infrastructure. Performance, application service levels, security, and usability no longer need to be compromised, and importantly, users will benefit from the most cost effective infrastructure.

The purpose of this document is to describe virtualization networking management with RHEV-M utilizing Mellanox InfiniBand HCAs and switches as a fabric interconnect.

This reference architecture demonstrates how to build a fully integrated InfiniBand FDR interconnect cloud infrastructure with RHEV-M and covers the installation and setup including:

- Installation and configuration of the RHEV and Mellanox components: Adapters, switches, storage accelerator and fabric manger
- Datacenter configuration – various configuration flows needed to operate the network
- Monitoring and troubleshooting



2 Getting Started

2.1 Basic Test Bed Configuration

Host1 IP 172.30.40.104
Host2 IP 172.30.40.118
Host2-1 IP 172.30.40.147
Host3 IP 172.30.40.106
Host4 IP 172.30.40.120

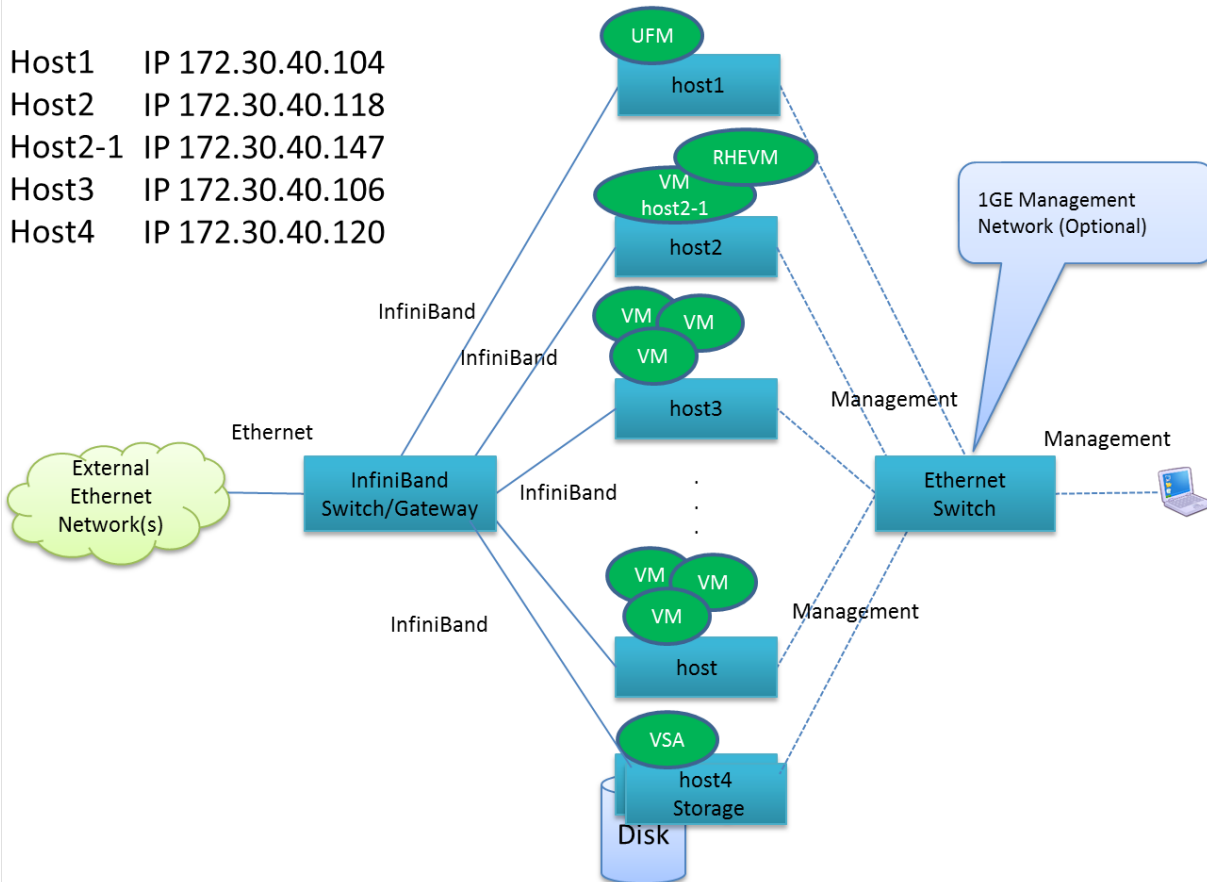


Figure 1: Basic Test Bed Scenario - Example



2.2 Required Hardware

Table 1: Required Hardware

Equipment	Notes
Mellanox SX6036/Grid Director 4036E InfiniBand/Gateway switch	Used for Data/Storage network. An InfiniBand switch can be used, The gateway is used to be connected to external Ethernet networks.
Ethernet Switch (Optional)	1GE - Used for Management network. Management network can be done over a (separate) InfiniBand partition as well.
Server (refer to the UFM User Manual specific server information)	Used for UFM application
Server (refer to the VSA User Manual specific server information)	Used for VSA application
Server (refer to Red Hat Enterprise Virtualization 3.0 - Installation Guide)	Used for RHEV-M application
Server (refer to Red Hat Enterprise Virtualization 3.0 - Installation Guide)	Used as virtual machine (VM) hosts in the clusters

2.3 Required Software Packages

- ¹Mellanox OFED Driver. Please contact cloudsupport@mellanox.com to obtain this package.
- ¹[Unified Fabric Manager \(UFM\)](#)
- ¹[Mellanox Storage Accelerator \(VSA\) – version 2.1.1-1](#)
- ¹Mellanox Network Manager (MNM) – version 1.0 Please contact cloudsupport@mellanox.com to obtain this package.

1 Mellanox Technologies packages are supported by Mellanox and not included in the Red Hat distributions.



- [Red Hat Enterprise Linux \(RHEL\) 6.2 \(or higher\)](#)
- [Red Hat Enterprise Virtualization 3.0 \(RHEV, RHEV-M\) or higher](#)

3 Software Installation and Basic Configuration

The reference solution contains several software applications and HW components. The following chapter supplies basic software installation procedures.

3.1 RHEV-M Installation (Host2-1)

To perform initial installation and configuration of the Red Hat Enterprise Virtualization Manager (RHEV-M), follow the steps below on “host2-1”:

Step 1: Install Red Hat Enterprise Linux (RHEL) 6.2. You may use the default installation of RHEL – “Basic Server”.

The default installation of Red Hat Enterprise Linux is a basic server install. You can optionally select a different set of software now.

- ☒ Basic Server
- ☐ Database Server
- ☐ Web Server
- ☐ Identity Management Server
- ☐ Virtualization Host
- ☐ Desktop

Figure 2: Red Hat Enterprise Linux Installation

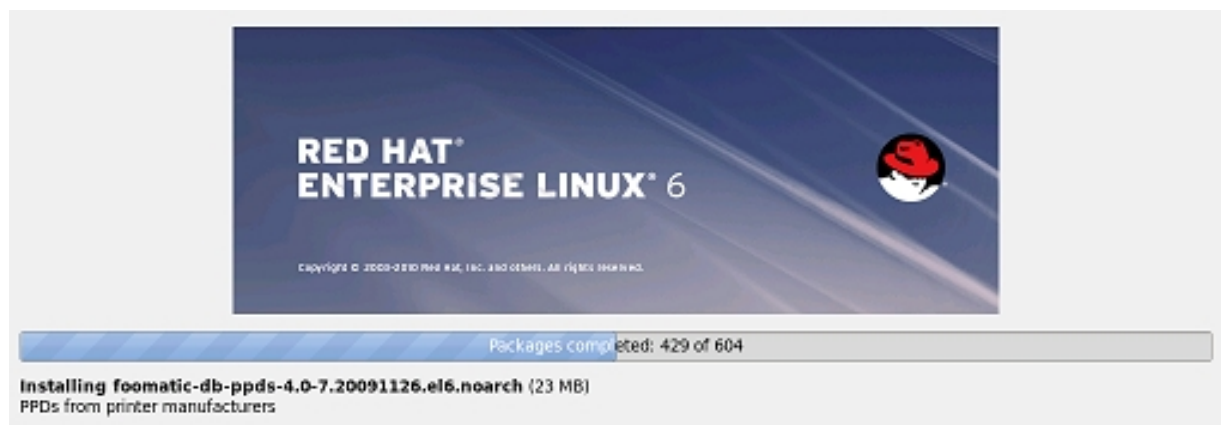


Figure 3: Red Hat Enterprise Linux Installation

Step 2: Ensure the VM has installed RHEL 6.2 successfully.



Step 3: Activate NTP services.

```
[root@host2-1]# /etc/init.d/ntpd status
ntpd is stopped

[root@host2-1]# /etc/init.d/ntpd start
Starting ntpd: [ OK ]

[root@host2-1]# /sbin/chkconfig ntpd on
[root@host2-1]# /etc/init.d/ntpd status
ntpd (pid 5197) is running...

[root@host2-1]#
```

Step 4: Register to the Red Hat Network (RHN).

```
[root@host2-1]# rhn_register
```

...



Figure 4: Red Hat Network - Register

Step 5: Subscribe to the required channels. Run:

```
[root@host2-1]# rhn-channel --add
--channel=rhel-x86_64-server-6-rhev-m-3
Username: meldcs
Password:
[root@host2-1]# rhn-channel --add
```



```
-channel=jbappplatform-5-x86_64-server-6-rpm
Username: meldcs
Password:
[root@host2-1]#rhn-channel --add
--channel=rhel-x86_64-server-supplementary-6
Username: meldcs
Password:
[root@host2-1]#
```

Step 6: Confirm the list of channels to which the server is subscribed.

```
[root@host2-1]#rhn-channel -list
jbappplatform-5-x86_64-server-6-rpm
rhel-x86_64-server-6
rhel-x86_64-server-6-rhev-3
[root@host2-1]#
```

Step 7: If installed, the `classpathx-jaf` package must be removed. It conflicts with some of the components installed to support JBoss.

```
[root@host2-1]# yum remove classpathx-jaf
Loaded plugins: product-id, rhnplugin, security, subscription-manager
Updating certificate-based repositories.
Unable to read consumer identity
Setting up Remove Process
No Match for argument: classpathx-jaf
jbappplatform-5-x86_64-server-6-rpm
| 1.3 kB      00:00
jbappplatform-5-x86_64-server-6-rpm/primary
| 94 kB      00:00
jbappplatform-5-x86_64-server-6-rpm
401/401
rhel-x86_64-server-6-rhev-3
| 1.6 kB      00:00
rhel-x86_64-server-6-rhev-3/primary
| 23 kB      00:00
```



```
rhel-x86_64-server-6-rhev-m-3
121/121
rhel-x86_64-server-supplementary-6
| 1.8 kB      00:00

rhel-x86_64-server-supplementary-6/primary
| 91 kB      00:00
rhel-x86_64-server-supplementary-6
249/249
Package(s) classpathx-jaf available, but not installed.
No Packages marked for removal

[root@host2-1]#
```

Step 8: Use yum to ensure that the most up to date versions of all installed packages are in use.

```
[root@host2-1]#yum upgrade
```

...

Step 9: Use yum to initiate installation of the RHEV-M package and all dependencies.

```
[root@host2-1]#yum install rhvm
```

...

Note: You must run this command as the root user.

Step 10: Once package installation is complete, RHEV-M must be configured. Use the `rhvm-setup` script command:

```
[root@host2-1]#rhvm-setup

Welcome to RHEV Manager setup utility

HTTP Port [8080] :

HTTPS Port [8443] :

Host fully qualified domain name, note that this name should be fully
resolvable [host2-1.lab.mtl.com] :

Password for Administrator (admin@internal) :

Warning: Weak Password.

Confirm password :
```



Database password (required for secure authentication with the locally created database) :

Warning: Weak Password.

Confirm password :

Organization Name for the Certificate: Mellanox

The default storage type you will be using ['NFS' | 'FC' | 'ISCSI'] [NFS] : ISCSI

Should the installer configure NFS share on this server to be used as an ISO Domain? ['yes' | 'no'] [yes] : no

Firewall ports need to be opened.

You can let the installer configure iptables automatically overriding the current configuration. The old configuration will be backed up.

Alternately you can configure the firewall later using an example iptables file found under /usr/share/rhev/conf/iptables.example

Configure iptables ? ['yes' | 'no']: yes

RHEV Manager will be installed using the following configuration:

=====

http-port:	8080
https-port:	8443
host-fqdn:	host2-1.lab.mtl.com
auth-pass:	*****
db-pass:	*****
org-name:	Mellanox
default-dc-type:	ISCSI
override-iptables:	yes

Proceed with the configuration listed above? (yes|no): yes

Installing:

Creating JBoss Profile...	[DONE]
Creating CA...	[DONE]
Setting Database Security...	[DONE]
Creating Database...	[DONE]
Updating the Default Data Center Storage Type...	[DONE]
Editing JBoss Configuration...	[DONE]



```
Editing RHEV Manager Configuration...          [ DONE ]
Configuring Firewall (iptables)...             [ DONE ]
Starting JBoss Service...                      [ DONE ]

**** Installation completed successfully ****

(Please allow RHEV Manager a few moments to start up....)

Additional information:

* SSL Certificate fingerprint:
2E:EB:D8:9C:61:DD:99:0E:85:9C:76:02:26:B5:57:B5:3E:D6:1F:3A

* SSH Public key fingerprint:
ac:7e:ec:f2:47:91:c3:90:18:98:ae:5d:e0:88:b4:e2

* The firewall has been updated, the old iptables configuration file was
saved to /usr/share/rhevman/conf/iptables.backup.104857-07312012_5209

* The installation log file is available at: /var/log/rhevman/rhevman-
setup_2012_07_31_10_47_13.log

* Please use the user "admin" and password specified in order to login into
RHEV Manager

* To configure additional users, first configure authentication domains
using the 'rhevman-manage-domains' utility

* To access RHEV Manager please go to the following URL:
http://host2-1:8080

[root@host2-1]#
```

To ensure that the installation does not fail, make sure that the locale settings are as follows:

```
(host)#locale
LANG=en_US.UTF-8
LC_CTYPE="en_US.UTF-8"
LC_NUMERIC="en_US.UTF-8"
LC_TIME="en_US.UTF-8"
LC_COLLATE="en_US.UTF-8"
LC_MONETARY="en_US.UTF-8"
LC_MESSAGES="en_US.UTF-8"
LC_PAPER="en_US.UTF-8"
```




```
LC_NAME="en_US.UTF-8"
LC_ADDRESS="en_US.UTF-8"
LC_TELEPHONE="en_US.UTF-8"
LC_MEASUREMENT="en_US.UTF-8"
LC_IDENTIFICATION="en_US.UTF-8"
LC_ALL=
```

Note: Access the administration portal by pointing Internet Explorer to http://your_server:8080 (assuming defaults are used during installation). Use the administrator username and password supplied in the configuration step. .NET Framework installation prompting may appear if accessing the RHEV-M Portal for the first time.

Step 11: Access the administration portal by pointing the Internet browser to <http://host2-1:8080>.

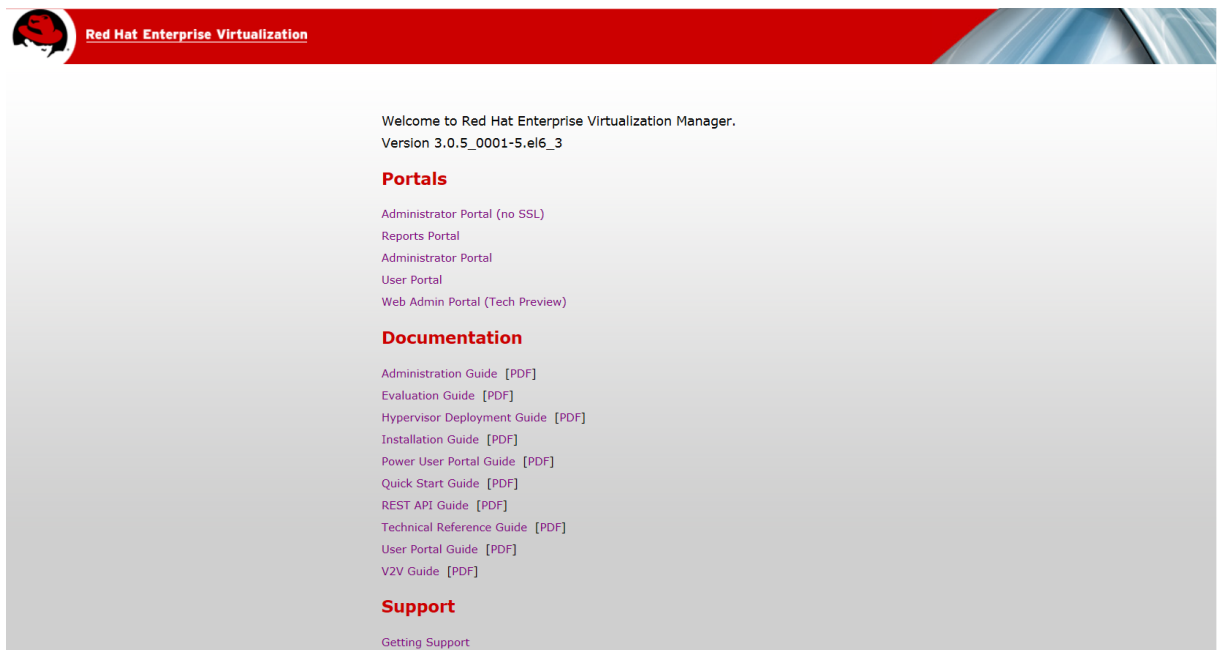


Figure 5: RHEV-M Portal

Note: For advance configuration of the RHEV-M refer to “[Red Hat Enterprise Virtualization 3.0 – Installation Guide](#)”.



3.2 RHEV Host Installation (Host3)

Follow these steps for RHEV installation:

Step 1: Install RHEL 6.2. You may use the default installation of RHEL – “Basic Server”.

The default installation of Red Hat Enterprise Linux is a basic server install. You can optionally select a different set of software now.

- ☒ Basic Server
- ☐ Database Server
- ☐ Web Server
- ☐ Identity Management Server
- ☐ Virtualization Host
- ☐ Desktop

Figure 6: Red Hat Enterprise Linux Installation

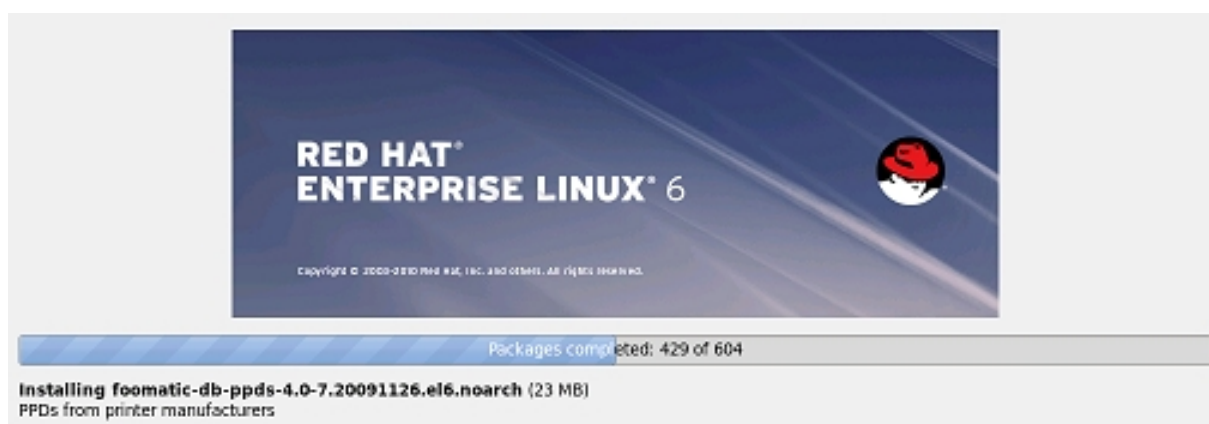


Figure 7: Red Hat Enterprise Linux Installation

Step 2: Ensure the VM has installed RHEL 6.2 successfully.

Step 3: Activate NTP services.

```
[root@host3]# /etc/init.d/ntpd status
ntpd is stopped

[root@host3]# /etc/init.d/ntpd start
Starting ntpd: [ OK ]

[root@host3]# /sbin/chkconfig ntpd on

[root@host3]# /etc/init.d/ntpd status
ntpd (pid 5197) is running...

[root@host3]#
```



Step 4: Register to the Red Hat Network (RHN).

```
[root@host3]#rhn_register
```

...

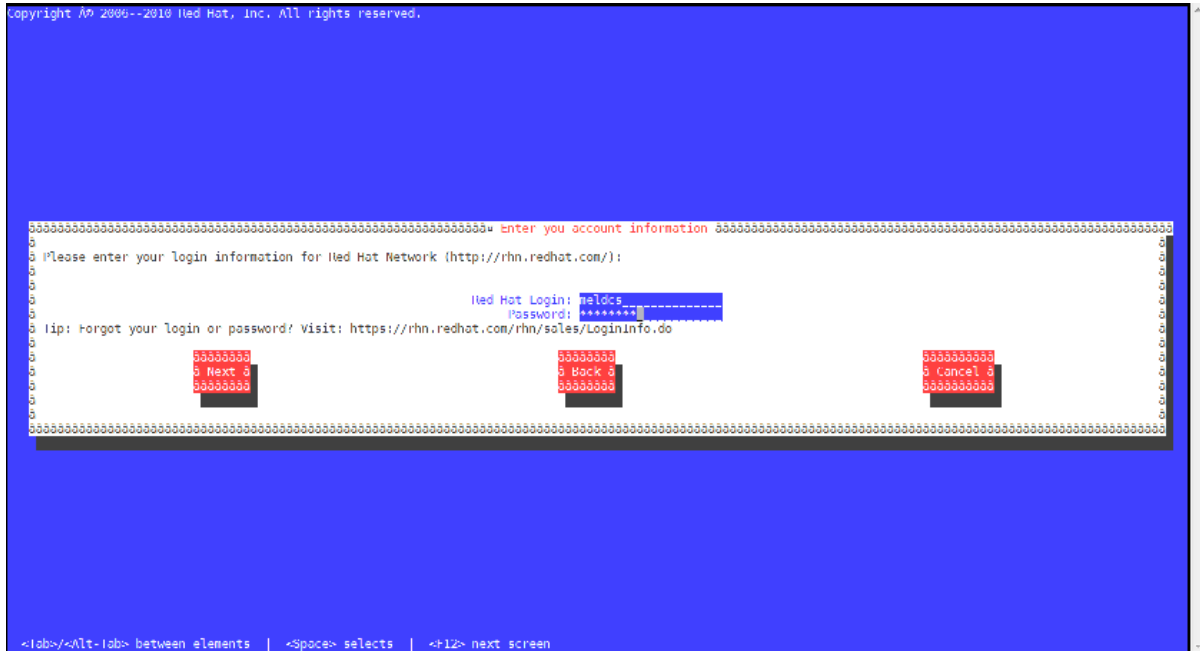


Figure 8: Red Hat Network - Register

Step 5: Subscribe to the required channels. Run:

```
[root@host3]# rhn-channel --add --channel=rhel-x86_64-server
```

Username: meldcs

Password:

```
[root@host3]# rhn-channel --add --channel=rhel-x86_64-rhev-mgmt-agent-6
```

Username: meldcs

Password:

```
[root@host3]#
```

Step 6: Confirm the list of channels to which the server is subscribed. Run:

```
[root@host3]#rhn-channel -list
```

rhel-x86_64-rhev-mgmt-agent-6

rhel-x86_64-server-6

```
[root@host3]#
```



Step 7: Add a manual host entry to the `/etc/hosts` file (on the Red Hat Enterprise Linux host) for the RHEV-M server to enable vdsmd and other services to connect properly to the host (if not using DNS services).

```
10.0.0.1 server1.example.com rhel-manager.server1.example.com
```

For example:

```
172.30.40.147 host2-1.lab.mtl.com rhel-manager.host2-1.lab.mtl.com
```

Step 8: Open firewall ports.

The following commands will remove existing firewall rules and add the required ports by RHEV-M to the iptables rules.

```
[root@host3]# iptables --flush

[root@host3]# iptables --append INPUT -m state --state ESTABLISHED,RELATED
-j ACCEPT

[root@host3]# iptables --append INPUT -p icmp -j ACCEPT

[root@host3]# iptables --append INPUT -i lo -j ACCEPT

[root@host3]# iptables --append INPUT -p tcp --dport 22 -j ACCEPT

[root@host3]# iptables --append INPUT -p tcp --dport 16514 -j ACCEPT

[root@host3]# iptables --append INPUT -p tcp --dport 54321 -j ACCEPT

[root@host3]# iptables --append INPUT -p tcp -m multiport --dports 5634:6166
-j ACCEPT

[root@host3]# iptables --append INPUT -p tcp -m multiport --dports
49152:49216 -j ACCEPT

[root@host3]# iptables --append INPUT -j REJECT --reject-with icmp-host-
prohibited

[root@host3]# iptables --append FORWARD -m physdev ! --physdev-is-bridged -j
REJECT --reject-with icmp-host-prohibited

[root@host3]# /etc/init.d/iptables save

[root@host3]# chkconfig iptables on

[root@host3]# service iptables restart
```

Step 9: RHEV-M makes use of `sudo` to perform operations as root on the host. The default configuration stored in `/etc/sudoers` contains values to allow this. To configure `sudo` access, add the following entry to `/etc/sudoers`.

```
root ALL=(ALL) ALL
```

Step 10: Enable SSH access for root user. Add the following entry in `/etc/ssh/sshd_config`.



```
PermitRootLogin yes
```

Step 11: Restart the SSH server.

```
[root@host3]# service sshd restart
```

Note: For advanced configuration of the RHEV-M refer to “[Red Hat Enterprise Virtualization 3.0 – Installation Guide](#)”.

3.3 Mellanox OFED Driver Installation (All Hosts)

Any host in the fabric shall have Mellanox OFED installed.

Follow the steps below for basic Mellanox OFED installation on all hosts.

Step 1: Download Mellanox OFED from www.mellanox.com and locate it in your file system.

Step 2: ²Install Mellanox OFED from the source.

```
# yum install libstdc++-devel flex bison gcc-c++ libstdc++-devel zlib-devel  
libtool glibc-devel gcc kernel-devel rpm-build  
iscsi-initiator-utils redhat-rpm-config tc1-devel
```

Step 3: Download the OFED iso. Run:

```
# mkdir /mnt/tmp  
# mount -o loop MLNX_OFED_LINUX-1.8.6-rhel6.2-x86_64.iso /mnt/tmp  
# cd /mnt/tmp  
# ./mlnxofedinstall
```

Step 4: Reboot the server (in case the firmware is updated).

Step 5: Verify Mellanox OFED installation. When running `ibv_devinfo` the following output should appear:

```
(host)# ibv_devinfo  
  
hca_id: mlx4_0  
      transport:                      InfiniBand (0)  
      fw_ver:                          2.9.1080  
      node_guid:                       0002:c903:000d:1410
```

- 2 If the running kernel version does not match with any of the offered pre-built RPMs, add the kernel version by using the “`mlnx_add_kernel_support.sh`” script located under the docs/di-rectory. For further information, please refer to MINX_OFED User Manual Section Pre-installation Notes for the `mlnx_add_kernel_support.sh` tool.



```
sys_image_guid:      0002:c903:000d:1413
vendor_id:           0x02c9
vendor_part_id:      26428
hw_ver:              0xB0
board_id:            MT_0DD0110009
phys_port_cnt:       2

    port:  1
        state:          PORT_ACTIVE (4)
        max_mtu:         2048 (4)
        active_mtu:      2048 (4)
        sm_lid:          24
        port_lid:        22
        port_lmc:        0x00
        link_layer:      IB

    port:  2
        state:          PORT_ACTIVE (4)
        max_mtu:         2048 (4)
        active_mtu:      1024 (3)
        sm_lid:          0
        port_lid:        0
        port_lmc:        0x00
        link_layer:      Ethernet
```

Step 6: Set up an IP address for the “ib0” interface by editing the *ifcfg-ib0* file and running *ifup* as follows:

```
# vi /etc/sysconfig/network-scripts/ifcfg-ib0

DEVICE=ib0

BOOTPROTO=none

ONBOOT="yes"

IPADDR=192.168.20.103

NETMASK=255.255.255.0

NM_CONTROLLED=yes
```



```
TYPE=Infiniband
```

```
# ifup ib0
```

Step 7: Add eIPoIB Interfaces. Make sure the host is connected to an InfiniBand network and that the latest Mellanox OFED that supports eIPoIB is installed.

Step 8: Locate the interface. Edit the following line in the file `/etc/infiniband/openib.conf`:

```
E_IPoIB_LOAD=yes
```

If the `E_IPoIB_LOAD = no` , please change it and reload openibd process, as follows:

```
#/etc/init.d/openibd restart
```

Step 9: Run the following command after OFED installation to see all the eIPoIB interfaces:

```
# cat /sys/class/net/eth_ipoib_interfaces
```

```
eth5 over IB port: ib0
```

Step 10: ³To find the right interface, run:

```
# ibdev2netdev
```

```
mlx4_0 port 2 ==> eth0 (Up)
```

```
mlx4_0 port 1 ==> eth5 (Down)
```

```
mlx4_0 port 1 ==> ib0 (Up)
```

It appears in the above commands that the interface (eth5) is associated with the first port on the first HCA.

Step 11: To further ensure that this interface is a PV-IPoIB interface, you may run:

```
#ethtool -i eth5
```

```
driver: eth_ipoib
```

```
version: 1.0.0
```

```
firmware-version: 1
```

Note: For additional options and advanced installation refer to Mellanox OFED User Manual⁴.

3.4 Mellanox VSA Installation (Host4)

³ If your kernel version does not match with any of the offered pre-built RPMs, you can add your kernel version by using the “`mlnx_add_kernel_support.sh`” script located under the docs/directory. For further information, please refer to MINX_OFED User Manual Section Pre-installation Notes for the `mlnx_add_kernel_support.sh` tool.



iSER- ConnectX's RDMA capabilities can be used to accelerate hypervisor traffic such as storage access, VM migration, data and VM replication. The use of RDMA moves the data from node-to-node to the ConnectX hardware, producing much faster performance, lower latency/access-time, and lower CPU overhead and provides zero-copy message transfers for SCSI packets. Thus, the RAID for a cluster may now be connected via InfiniBand and result in saving additional storage costs such as Fibre Channel, thereby greatly reducing the cost of the cluster. When using RDMA-based iSCSI (iSER) compared to traditional TCP/IP based iSCSI, RDMA can provide 10X faster performance. This will also consolidate the efforts of both Ethernet and InfiniBand communities, and reduce the number of Storage protocols a user has to learn and maintain.

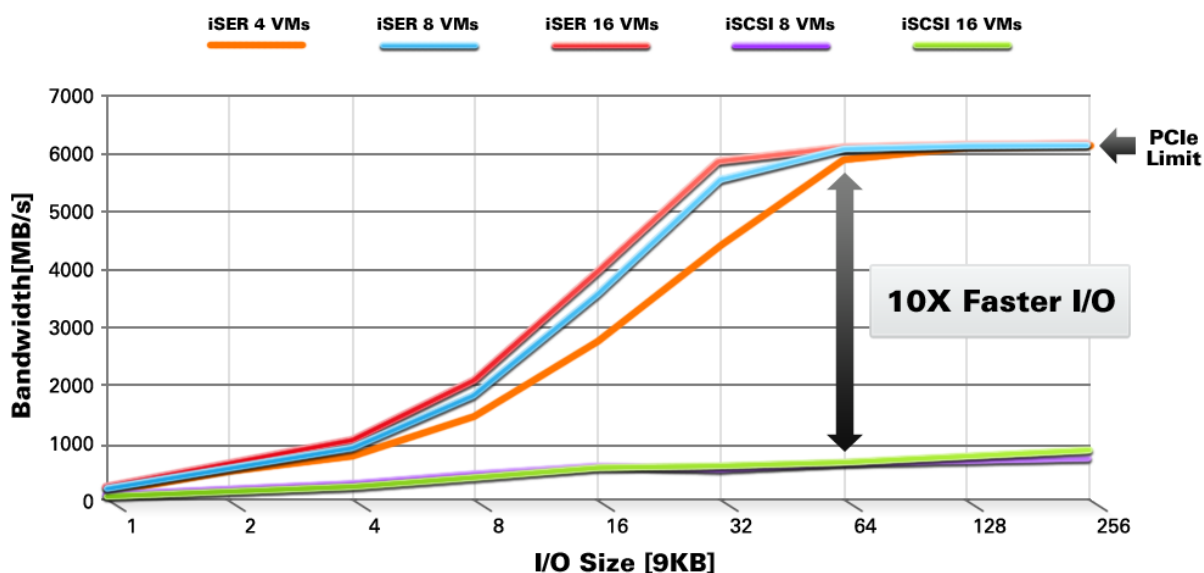


Figure 9: Using the ConnectX-3 adapter results in faster I/O traffic delivery rather than using multiple 10GbE ports

Mellanox's Storage Accelerator (VSA) software is a highly scalable, high performance, low-latency software solution for tier-one storage and gateways that provides ultra-fast remote block storage access that accelerates access to SAN, DAS, or Flash based storage.

Once the VSA is installed on your server, run `vscli` and perform the following VSA commands to enter VSA configuration mode:

```
(host)# vscli  
  
VSA-root> config  
  
VSA-/# show disks/
```

4 http://www.mellanox.com/content/pages.php?pg=products_dyn&product_family=26&menu_section=34



State	Idx	Name	Size	Cache	Vendor	Model
Serial	Rev	paths				
running	1	3600605b0032a49601601f69931f3bb42	667GB	0	LSI	MR9265-
8i 0042bbf33199f6011660492a03b00506	3.14	1				
running	2	3600605b0032882501643ddec0204767e	890GB	0	LSI	MR9265-
8i 007e760402ecdd431650822803b00506	3.14	1				
running	3	3600605b0032867601643c9ecd0d3de2c	890GB	0	LSI	MR9265-
8i 002cded3d0ecc9431660672803b00506	3.14	1				

```

VSA-/# add servers/ rhev-servers ips=192.168.20.101;192.168.20.103
VSA-/# add targets/iqn.iser.1 transport=iser,volumes=d1
VSA-/# set targets/iqn.iser.1 server=rhev-servers
VSA-/# save

```

For Mellanox VSA installation and advanced configuration, refer to the Mellanox VSA User Manual⁵.

3.5 Mellanox UFM Installation (Host1)

Mellanox's Unified Fabric Manager™ (UFM™) is a powerful platform for managing scale-out computing environments. UFM enables data center operators to efficiently monitor and operate the entire fabric, boost application performance and maximize fabric resource utilization.

For Mellanox UFM installation and basic configuration, please refer to the Mellanox UFM User Manual⁶.

3.6 Mellanox Network Manager Plugin

3.6.1 Installing Mellanox Network Manager Server

Copy the file *mellanox_nm_server.tar.gz* to the server that is running UFM.

```

# cd /tmp
# tar zxvf mellanox_nm_server.tar.gz
# cd mellanox_nm_server
# ./install.sh

```

3.6.2 Installing Mellanox Network Client

Copy the file *mellanox_nm_client.tar.gz* to each server in the fabric.

```

# cd /tmp
# tar zxvf mellanox_nm_client.tar.gz

```

⁵ <http://license1.mellanox.com> (a valid login is required for access)

⁶ <http://license1.mellanox.com> (a valid login is required for access)



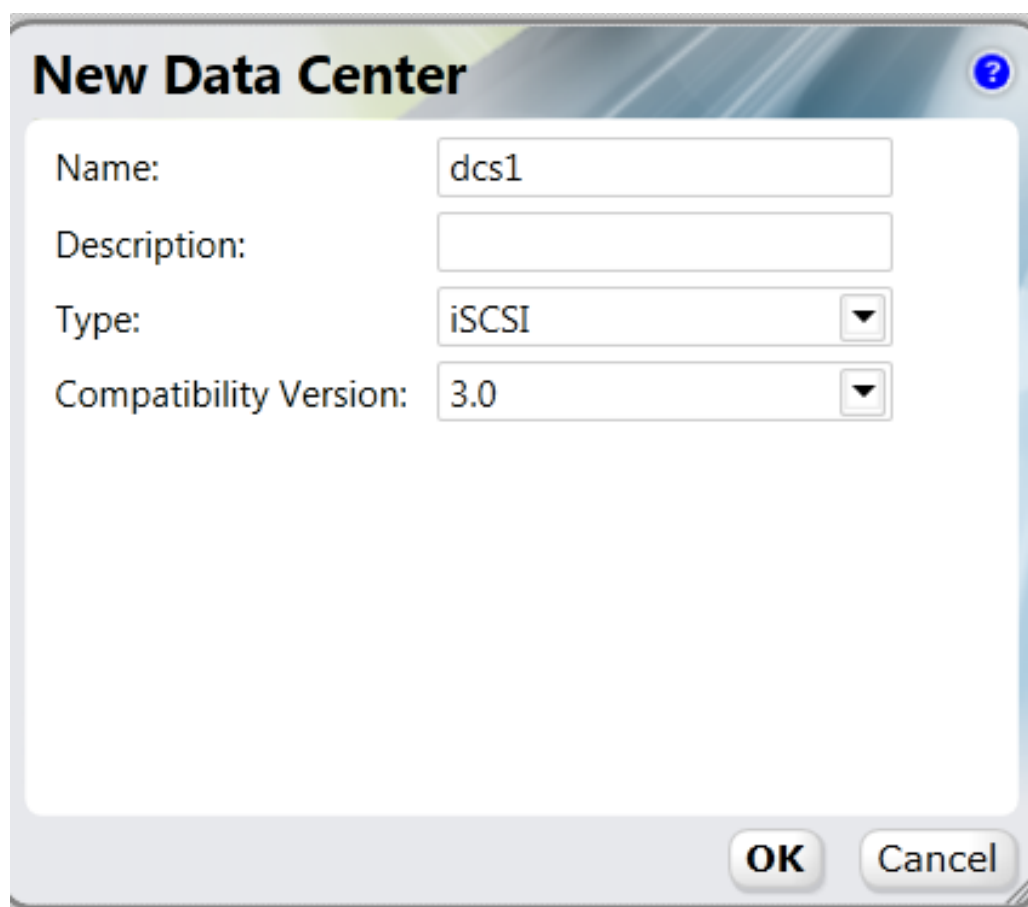
```
# cd mellanox_nm_client  
# ./install.sh
```

4 RHEV Manager Configuration

Before configuring Red Hat Enterprise Virtualization Manager (RHEV-M), please ensure it is installed and running.

4.1 Add Data-Center

To add a new data center in the RHEV-M portal, click on the *New Data Center* button.



The image shows a 'New Data Center' dialog box with the following fields and values:

Field	Value
Name:	dcs1
Description:	
Type:	iSCSI
Compatibility Version:	3.0

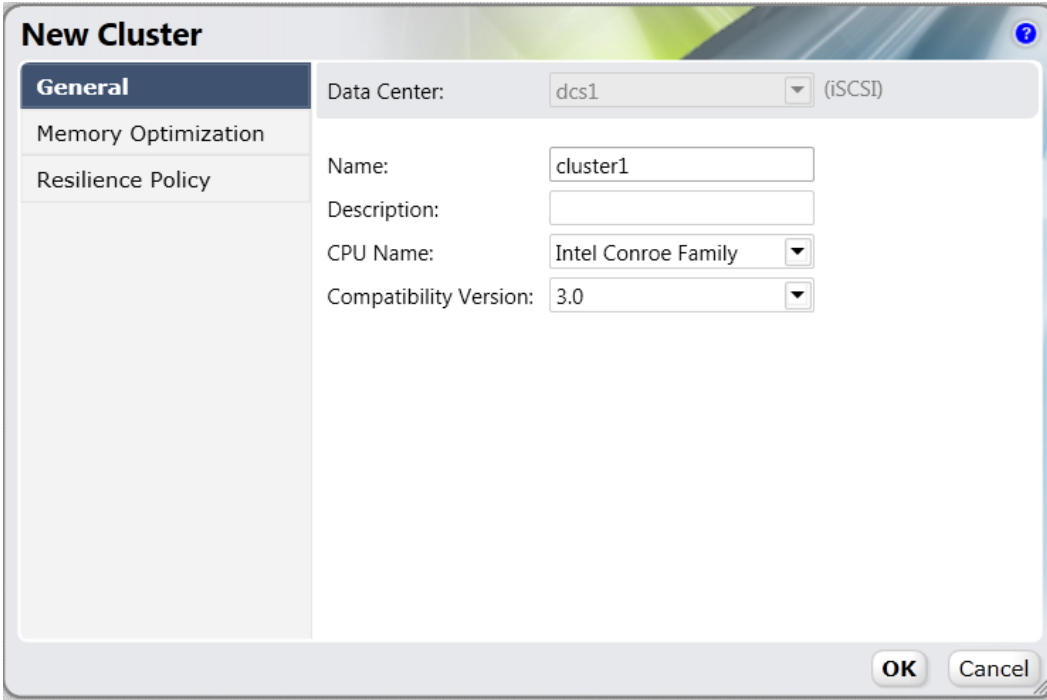
At the bottom right, there are 'OK' and 'Cancel' buttons. A help icon (?) is located in the top right corner of the dialog box.

Figure 10: New Data Center



4.2 Add Cluster

To add new cluster for the data center in RHEV-M, click on the **New Cluster** button:

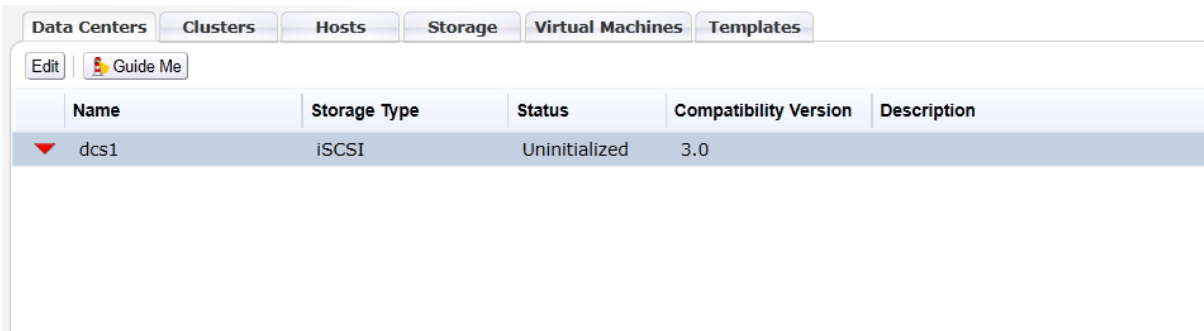


The 'New Cluster' dialog box is shown with the 'General' tab selected. It contains the following fields:

- Data Center:** dcs1 (iSCSI)
- Name:** cluster1
- Description:** (empty)
- CPU Name:** Intel Conroe Family
- Compatibility Version:** 3.0

Buttons at the bottom: OK, Cancel.

Figure 11: New Cluster



The 'Data Centers' tab is selected in the top navigation bar. Below it, there is a table with the following columns: Name, Storage Type, Status, Compatibility Version, and Description. The table contains one entry: dcs1, iSCSI, Uninitialized, 3.0.

Name	Storage Type	Status	Compatibility Version	Description
dcs1	iSCSI	Uninitialized	3.0	

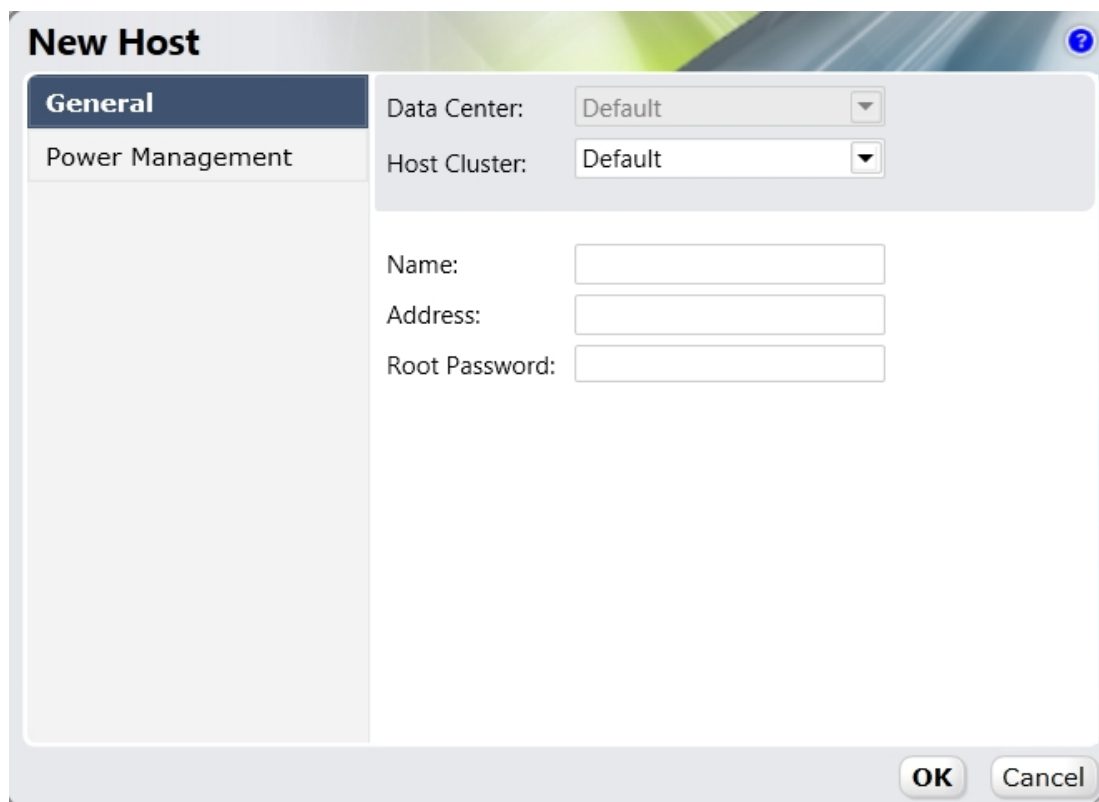
Figure 12: Data Center



4.3 Add Host

Follow the steps below in order to add a host:

Step 1: Go to **Hosts** tab and click on **New**.



The 'New Host' dialog box is shown with the 'General' tab selected. It contains the following fields:

- Data Center: Default (dropdown)
- Host Cluster: Default (dropdown)
- Name: (text input)
- Address: (text input)
- Root Password: (text input)

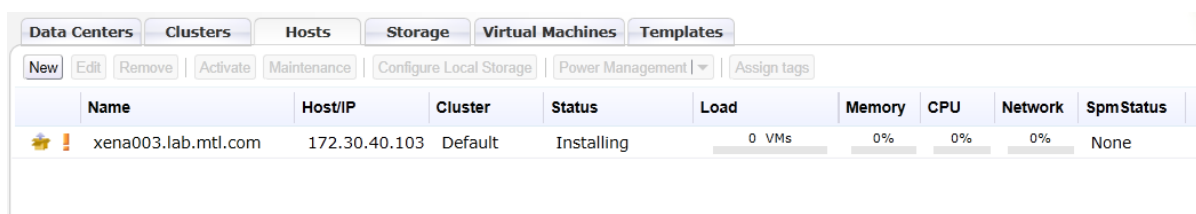
At the bottom right are 'OK' and 'Cancel' buttons.

Figure 13: Adding a Host

Step 2: Fill in the details as desired.

Note: If you intend to use UFM or Mellanox Network Plugin, it is necessary that the host name you give is the same as the host name in UFM.

After filling in the required details the installation starts.



The 'Hosts' tab is selected in the management console. The table below shows the status of the host 'xena003.lab.mtl.com'.

Name	Host/IP	Cluster	Status	Load	Memory	CPU	Network	SpmStatus
xena003.lab.mtl.com	172.30.40.103	Default	Installing	0 VMs	0%	0%	0%	None

Figure 14: Installation in Progress



After finishing the installation, the installer restarts the host. The virtual desktop and server manager daemon should be up and running.

Data Centers

Clusters

Hosts

Storage

Virtual Machines

Templates

New

Edit

Remove

Activate

Maintenance

Configure Local Storage

Power Management

Assign tags


	Name	Host/IP	Cluster	Status	Load	Memory	CPU	Network	SpmStatus
	xena003.lab.mtl.com	172.30.40.103	Default	Reboot	0 VMs	0%	0%	0%	None

Figure 15: Installation Complete

Step 3: Add iSER support by applying the *iscsi.py.patch*.

Note: Retrieve the *iscsi.py.patch* from Mellanox support, ready for RHEV 3.0. For RHEV 3.1 and later skip this section.

Step 4: Copy *iscsi.py.patch* to */tmp*, and run:

```
[root@host3]# cd /usr/share/vdsm/storage
[root@host3]# patch iscsi.py < /tmp/iscsi.py.patch
[root@host3]# service vdsm restart
```

Step 5: Verify that the VDSM daemon is running:

```
[root@host3]# /etc/init.d/vdsm status
VDS daemon server is running
```

Hosts

New

Edit

Remove

Activate

Maintenance

Configure Local Storage

Power Management

Assign tags



Name	Host/IP	Cluster	Status	Load	Memory	CPU	Network	SpmStatus
  xena006	172.30.40.106	cluster1	Up	0 VMs	4%	0%	0%	None

Figure 16: Host is Up

4.4 Add Storage

Perform the following operations in order to add a storage domain using RHEV-M.

Step 1: Connect to the RHEV-M Portal.

Step 2: Click *System* → *Default* → *Storage* → *New Domain*.

Step 3: Enter a name for the domain.

Step 4: Enter an IP of the VSA host.



Step 5: Click on *Discover*.

The 'New Domain' dialog box is shown with the following configuration:

- Name: store1
- Data Center: Default (iSCSI)
- Domain Function / Storage Type: Data / iSCSI
- Format: V2
- Use Host: xena001.lab.mtl.com

The 'Discover Targets' section is expanded, showing the following fields:

- Address: 192.168.20.120
- Port: 3260
- User Authentication: ☐ (unchecked)
- CHAP user name: (empty)
- CHAP password: (empty)

The 'Discover' button is visible. Below the 'Discover Targets' section, a table lists the discovered targets:

Target Name	Address	Port	
iqn.ramdisk5	192.168.20.120	3260	Login
iqn.rhev.iser.1	192.168.20.120	3260	Login

The 'Login All' button is located to the right of the table. The 'OK' and 'Cancel' buttons are at the bottom right.

Figure 17: Discovering Targets

Step 6: Click on *Login* located on the right of your chosen target.

The 'New Domain' dialog box is shown with the same configuration as in Figure 17. The 'Discover Targets' section is still expanded. The table lists the discovered targets:

Target Name	Address	Port	
iqn.ramdisk5	192.168.20.120	3260	Login
iqn.rhev.iser.1	192.168.20.120	3260	Login

The 'Login' button is now highlighted for the selected target 'iqn.ramdisk5'. The 'Login All' button is still present. The 'OK' and 'Cancel' buttons are at the bottom right.

Figure 18: Login to Target



Step 7: Choose the LUN to add and Click **OK**.

The 'New Domain' dialog box is shown with the following configuration:

- Name: store1
- Data Center: Default (iSCSI)
- Domain Function / Storage Type: Data / iSCSI
- Format: V2
- Use Host: xena001.lab.mtl.com

The 'Discover Targets' section shows the following details:

- Address: 192.168.20.120
- Port: 3260
- User Authentication: ☐ (CHAP user name and password fields are present but empty)
- Discover button
- Login All button

The 'LUNs' section displays a table of discovered targets:

Target Name	Address	Port
iqn.ramdisk5	192.168.20.120	3260
iqn.rhev.iser.1	192.168.20.120	3260

Below the targets, a table lists the LUNs:

LUN ID	Dev. Size	#path	Vendor ID	Product ID	Serial
<input checked="" type="checkbox"/> 1d0ecc9431660672803	890GB	1	LSI	MR9265-8i	SLSIMR92

Buttons at the bottom: OK, Cancel.

Figure 19: Choosing an LUN

The discovered storage domain will change from a non-operational status to operational.

The 'Storage' view shows a table of storage domains:

Domain Name	Domain Type	Storage Type	Format	Cross Data-Center Status	Free Space
store1	Data (Master)	iSCSI	V2	Active	886 GB

Figure 20: Successfully Adding a Storage Domain



4.5 Adding Virtual Machines to a Cluster

Step 1: Click on *System* → *Default* → *Clusters* → *Default* → *VMs* → *New Server*.

Step 2: Fill the details in *General* tab.

The screenshot shows the 'New Server Virtual Machine' dialog box with the 'General' tab selected. The dialog has a sidebar on the left with tabs: General, Console, Host, High Availability, Resource Allocation, Boot Options, and Custom Properties. The main area contains the following fields:

- Data Center: Default (dropdown)
- Host Cluster: Default (dropdown)
- Name: vm1 (text input)
- Description: (empty text input)
- Based on Template: Blank (dropdown)
- Memory Size: 2 GB (text input)
- Total Cores: 2 (spin box, range 2 to 32)
- CPU Sockets: 2 (spin box, range 1 to 16)
- Operating System: Red Hat Enterprise Linux 6.x x64 (dropdown)

At the bottom right are 'OK' and 'Cancel' buttons.

Figure 21: Adding New Virtual Machine - General



Step 3: Select *VNC* protocol in *Console* tab.

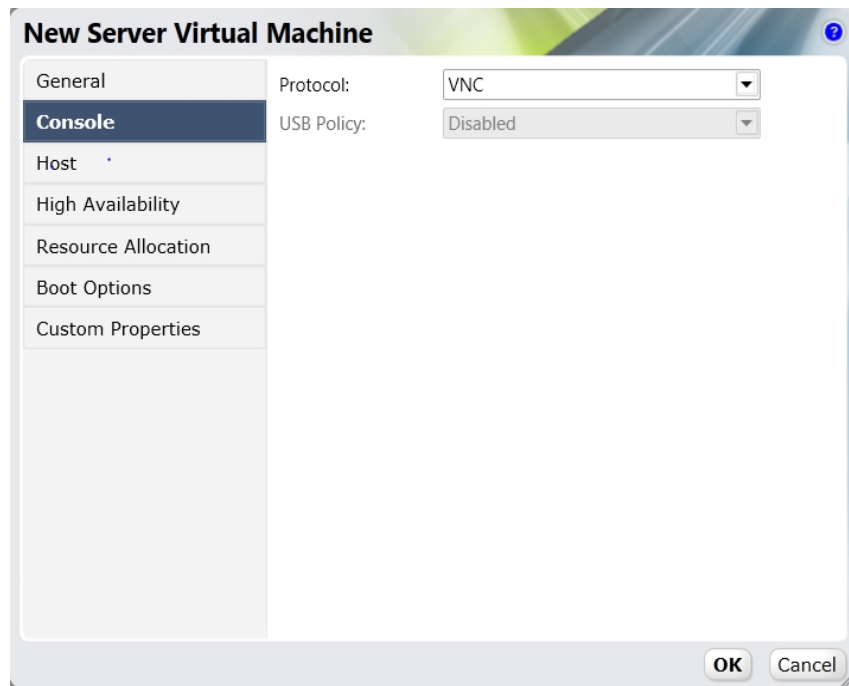


Figure 22: Adding a New Virtual Machine - Console

Step 4: In the *Host* tab, select the host you want the VM to run on.

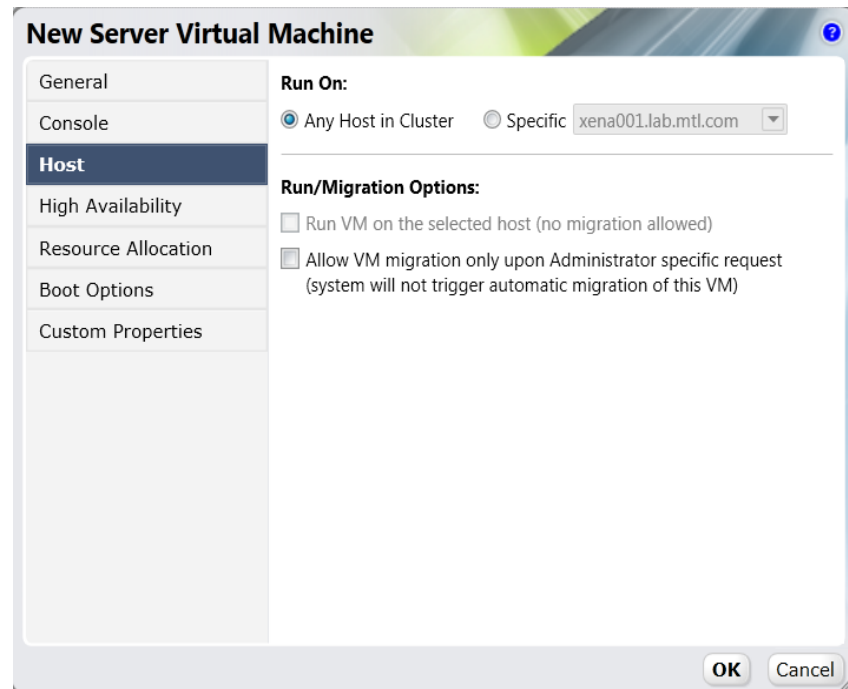


Figure 23: Adding a New Virtual Machine - Host



Step 5: Go to **Boot Options** tab and choose **Hard Disk** as the **First Device** and **PXE** as the **Second Device** then click the **OK** button at the bottom.

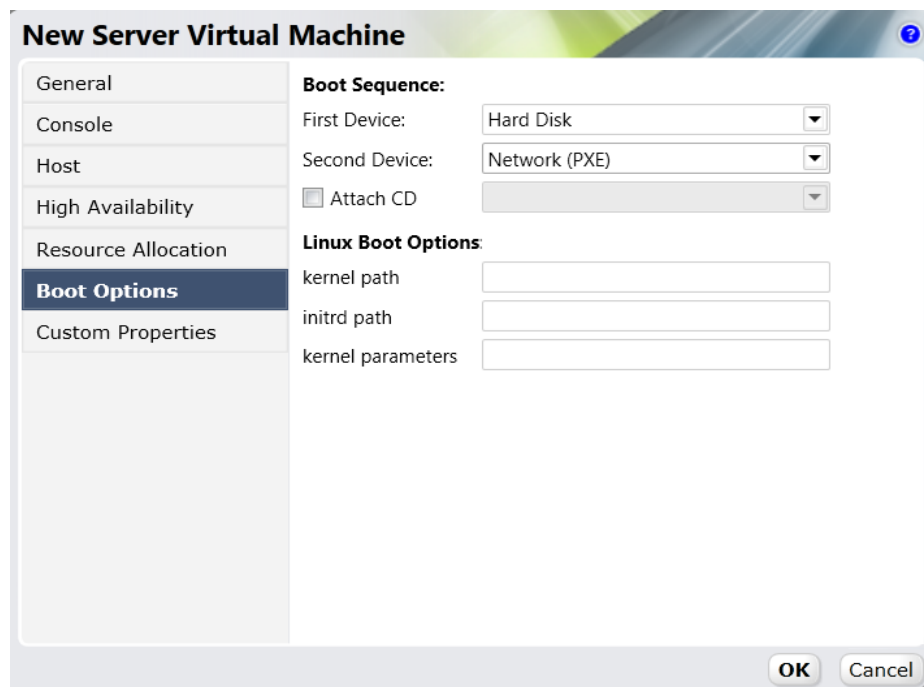


Figure 24: Adding a New Virtual Machine – Boot Options

Step 6: A wizard will pop up. Choose **Configure Network Interface**.

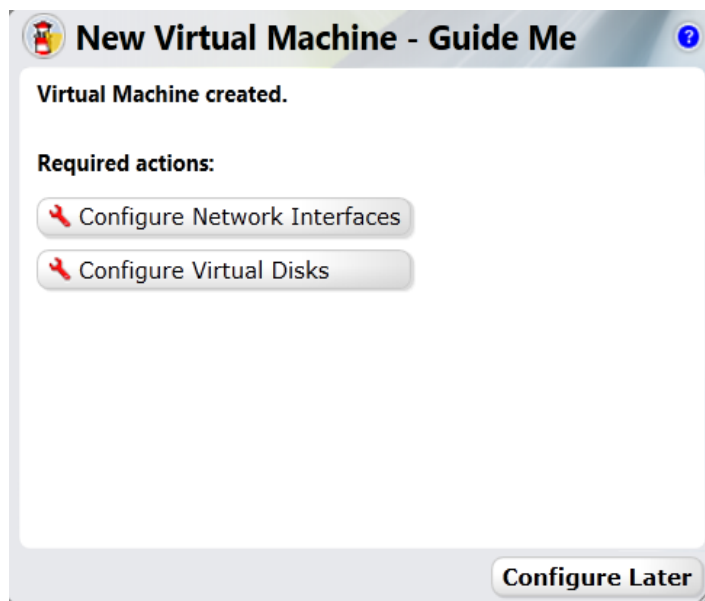


Figure 25: Adding a New Virtual Machine – Configuration



Step 7: Complete the details for the new HCA.

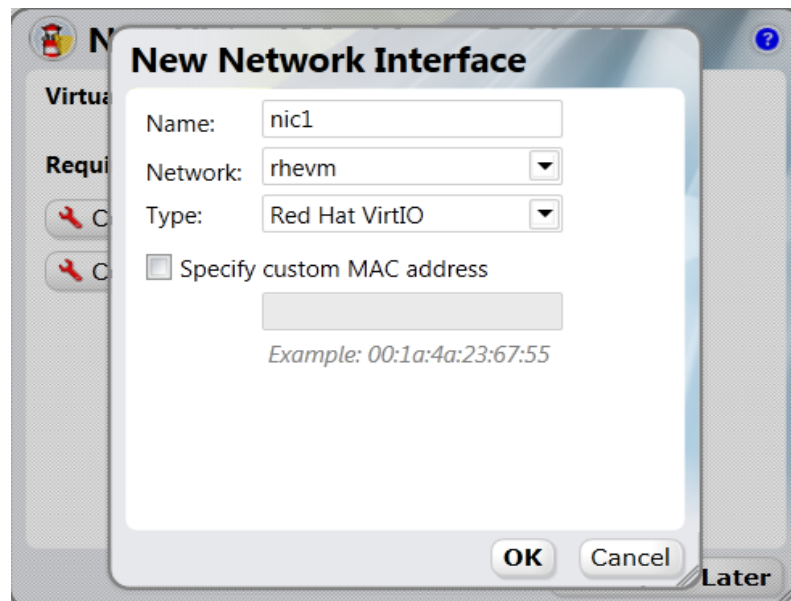


Figure 26: Adding a New Virtual Machine – Adding a New Network Interface

Step 8: Click on *Configure Virtual Disks* and fill in the details.

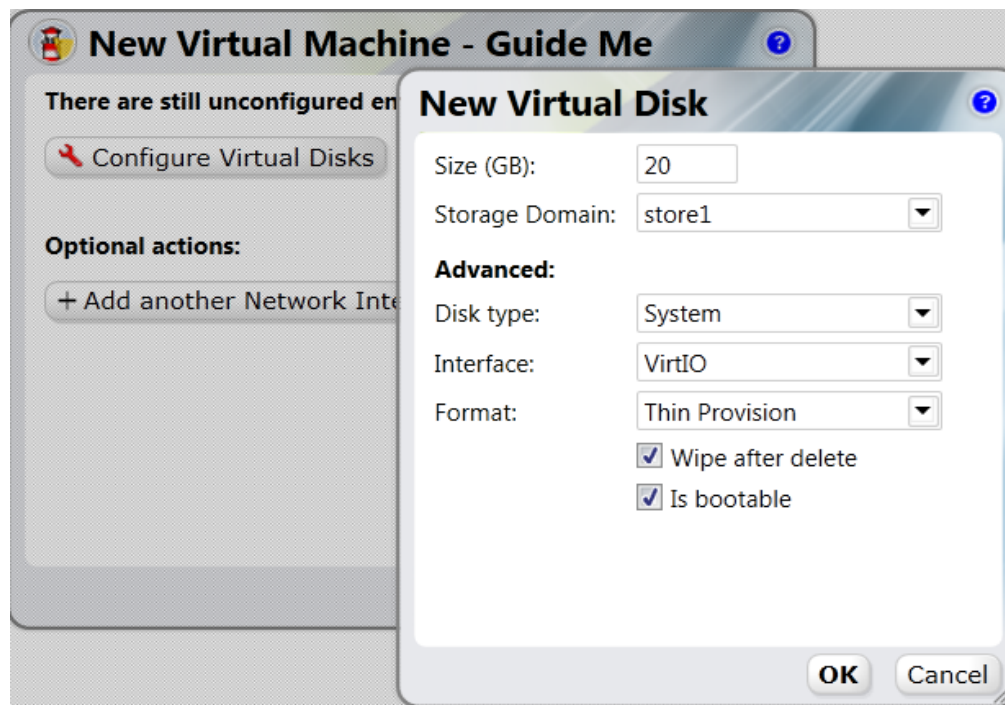


Figure 27: Adding a New Virtual Machine – Adding a New Virtual Disk



Step 9: Click *Configure Later* to finish.

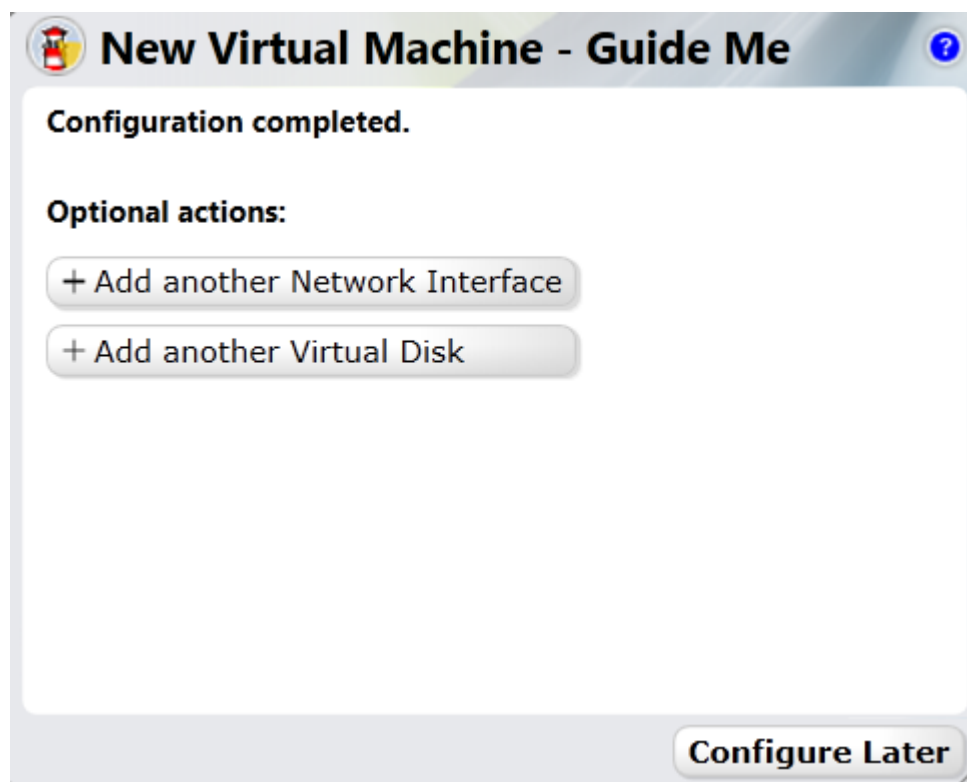


Figure 28: Adding a New Virtual Machine – Finishing Configuration

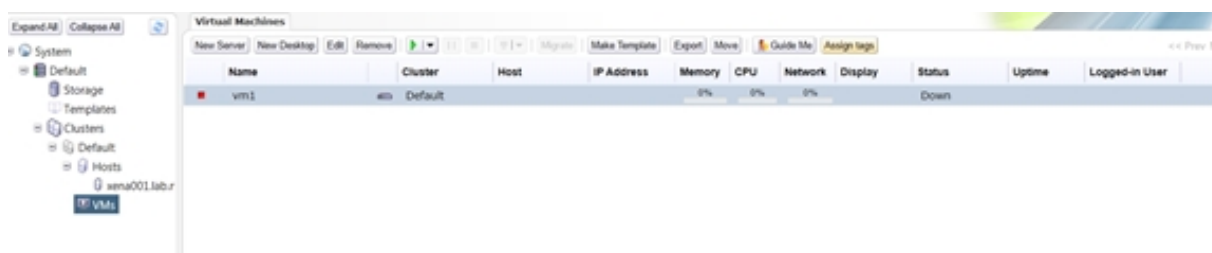


Figure 29: Adding a New Virtual Machine – VMs Screen



Step 10: Right click on the line of the VM and choose **Run**.

Step 11: In order to start the VM console, right-click and select **Console**.

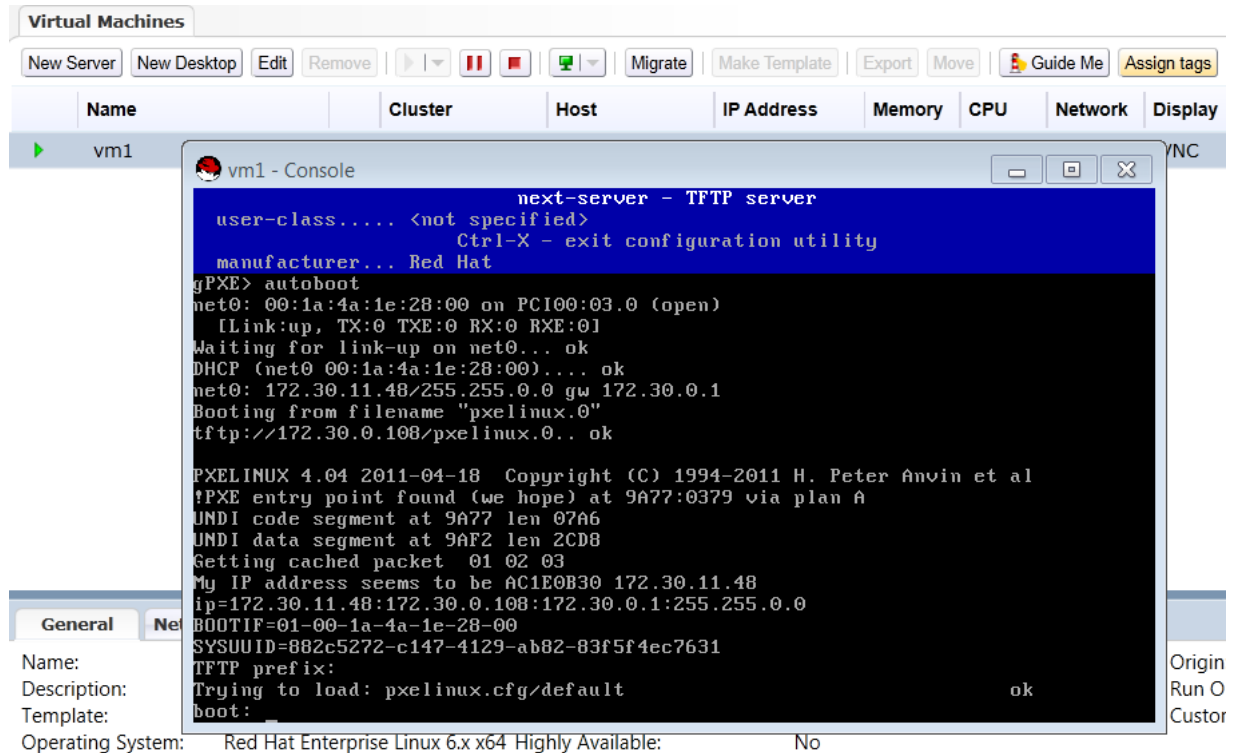


Figure 30: Adding a New Virtual Machine – VNC Screen

4.6 Add a Network to the Cluster

Step 1: Go to **System** → **Default**.

Step 2: Click on **Logical Networks** and then on **New**.

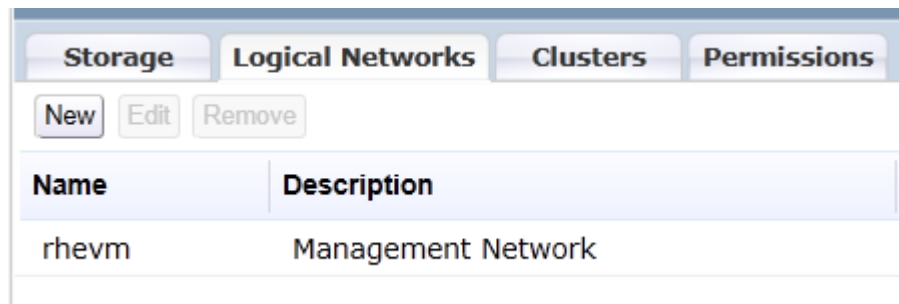
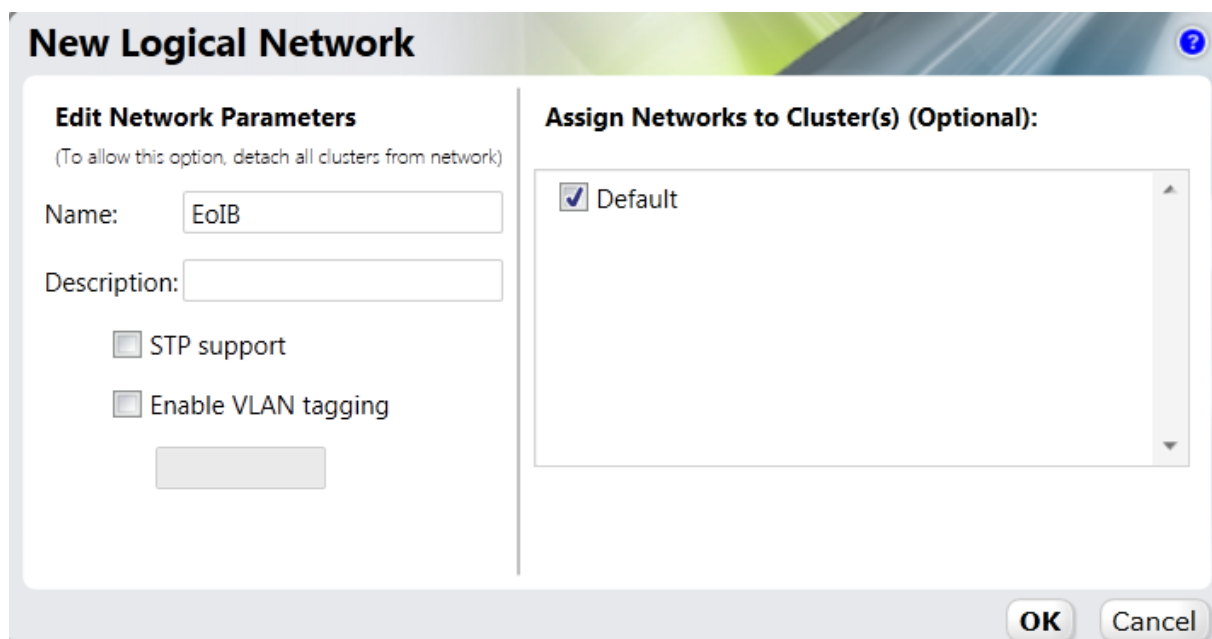


Figure 31: Logical Networks



Step 3: Fill in the details for the new *Logical Network*.



The dialog box is titled "New Logical Network". It is divided into two main sections. The left section, "Edit Network Parameters", includes a sub-note "(To allow this option, detach all clusters from network)", a "Name:" field with "EoIB" entered, a "Description:" field, and two checkboxes: "STP support" and "Enable VLAN tagging", both of which are unchecked. Below these is a disabled grey button. The right section, "Assign Networks to Cluster(s) (Optional):", contains a list box with "Default" selected and checked. At the bottom right are "OK" and "Cancel" buttons.

Figure 32: Adding a New Logical Network

The new logical network is available for use.

Storage		Logical Networks		Clusters	Permissions
New	Edit	Remove			
Name		Description			
rhevm		Management Network			
EoIB					

Figure 33: Added the New Logical Network



Step 4: Go to each host you want to connect to the new logical network and click **Edit** on the interface.

Step 5: Find which interface is eIPoIB. Run:

```
(config) # cat /sys/class/net/eth_ipoib_interfaces  
eth5 over IB port: ib0
```

Step 6: Provide an IP address and save the configuration.

Edit Network Interface

Name: eth8

Network: EoIB

☐ None

☐ DHCP

☒ Static

IP: 192 . 168 . 39 . 101

Subnet Mask: 255 . 255 . 255 . 0

Changes done to the Networking configuration are temporary until explicitly saved.
Check the check-box below to make the changes persistent.

☒ Save network configuration

OK Cancel

Figure 34: Adding a Network Interface to the Logical Network



The logical network name appears under the column Network Name for this interface.

Network Interfaces								
<div>Bond Detach Save Network Configuration</div>								
MAC	Speed (Mbps)	RX (Mbps)	TX (Mbps)	Drops (Pkts)		Bond	Vlan	Network Name
00:00:00:00:03:01	10000	< 1	< 1	0				EoIB
00:30:48:C4:40:1B	0	< 1	< 1	0				
00:30:48:C4:40:1A	1000	< 1	< 1	0				* rhevm
00:00:00:00:02:01	10000	< 1	< 1	0				

Figure 35: Added the Network Interface to the Logical Network

4.7 Add an Interface to VM

Step 1: Go to the *VMs* pane.

Step 2: Click on *Network Interface* tab.

Step 3: Click on *New* button – a pop-up will open.

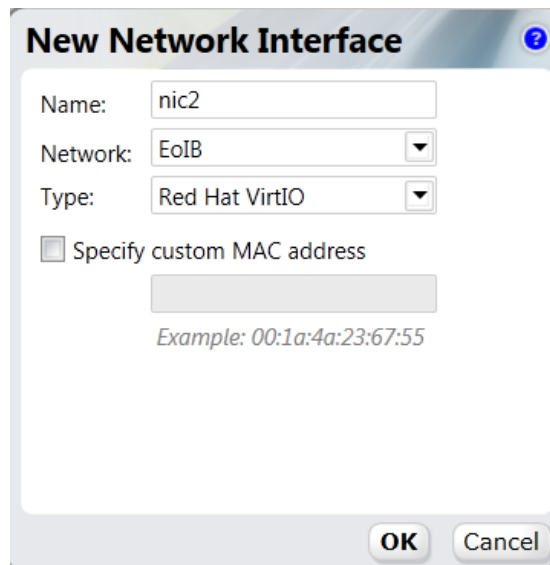
Virtual Machines									
<div>New Server New Desktop Edit Remove Migrate Make Template Export Move Guide Me Assign tags</div>									
Name	Cluster	Host	IP Address	Memory	CPU	Network	Display		
vm1	Default			0%	0%	0%			

General								
<div>Network Interfaces Virtual Disks Snapshots Applications Permissions</div>								
<div>New Edit Remove</div>								
Name	Network Name	Type	MAC	Speed (Mbps)	RX (Mbps)	TX (Mbps)	Drops (Pkts)	
nic1	rhevm	Red Hat Vi	00:1a:4a:1e:28:00	1000	< 1	< 1	0	

Figure 36: Virtual Machine – Network Interfaces View



Step 4: Fill in the details for the HCA.

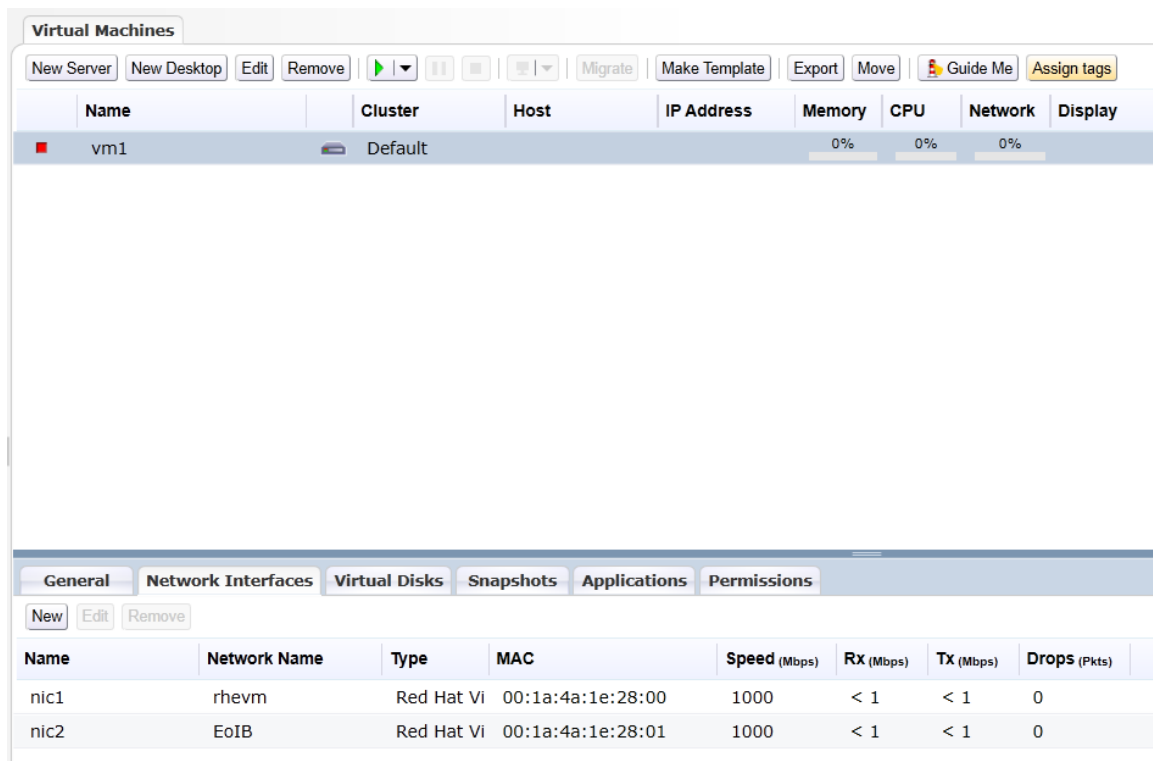


The dialog box titled "New Network Interface" contains the following fields and options:

- Name:
- Network:
- Type:
- ☐ Specify custom MAC address
-
- Example: 00:1a:4a:23:67:55
- Buttons: OK, Cancel

Figure 37: Adding a New Network Interface

The newly added network interface appears.



The screenshot shows the "Virtual Machines" interface with the "Network Interfaces" tab selected. The table below lists the network interfaces for the virtual machine "vm1".

Name	Network Name	Type	MAC	Speed (Mbps)	Rx (Mbps)	Tx (Mbps)	Drops (Pkts)
nic1	rhevm	Red Hat Vi	00:1a:4a:1e:28:00	1000	< 1	< 1	0
nic2	EoIB	Red Hat Vi	00:1a:4a:1e:28:01	1000	< 1	< 1	0

Figure 38: Added the New Network Interface



Step 5: Start the VM.

Step 6: Verify that the host has a new network interface for the VM. Run the command `ifconfig -a`.

```

RX packets:11550 errors:0 dropped:0 overruns:0 frame:0
TX packets:1939 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:4961519 (4.7 MiB) TX bytes:154762 (151.1 KiB)

eth1      Link encap:Ethernet  HWaddr 00:1A:4A:1E:28:01
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 b) TX bytes:0 (0.0 b)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:1047 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1047 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:72701 (70.9 KiB) TX bytes:72701 (70.9 KiB)

[root@localhost ~]# ifconfig eth1 192.168.39.201/24 up
3021q: adding VLAN 0 to HW filter on device eth1
You have new mail in /var/spool/mail/root
[root@localhost ~]# _
```

Figure 39: Verifying the New HCA is Up



5 Using UFM to Automate Network Management

Mellanox's Unified Fabric Manager™ (UFM™) is a powerful platform for managing scale-out computing environments. UFM enables data center operators to efficiently monitor and operate the entire fabric, boost application performance and maximize fabric resource utilization. UFM's automated and application-centric approach bridges the gap between servers, applications and fabric elements, thus enabling administrators to manage and optimize from the smallest to the largest and most performance-demanding clusters.

UFM provides the ability to monitor, troubleshoot, configure and optimize all fabric aspects available via only one interface. UFM's central dashboard provides a one-view fabric-wide status view.

UFM includes an advanced granular monitoring engine that provides real-time access to switch and host data, enabling cluster-wide monitoring of fabric health and performance, real-time identification of fabric-related errors and failures, quick problem resolution via granular threshold-based alerts, and a fabric utilization dashboard.

Fabric congestion is difficult to detect when using traditional management tools resulting in unnoticed congestion and fabric under-utilization. UFM's unique traffic map quickly identifies traffic trends, traffic bottlenecks, and congestion events spreading over the fabric which enables the administrator to identify and resolve problems promptly and accurately.

Using UFM, one can set specific service levels for different applications to ensure that critical applications get the right priority according to the fabric. QoS management is performed using a unique intelligent algorithm that determines the optimal configuration for each device location in the topology and its QoS capabilities.

UFM uses a logical fabric model to manage the fabric as a set of business-related entities such as time critical applications or services. The logical fabric model enables fabric monitoring and performance optimization on the application level rather than just at the individual port or device level. Managing the fabric using the logical fabric model provides improved visibility into fabric performance and potential bottlenecks, improved performance due to application-centric optimizations, quicker troubleshooting, and higher fabric utilization.

Refer to UFM User Manual⁶ for detailed installation and configuration options.



5.1 Basic UFM Configuration Flow

The following steps show how to create a logical server and UFM Network, and finally connecting between them.

Step 1: Create an environment.

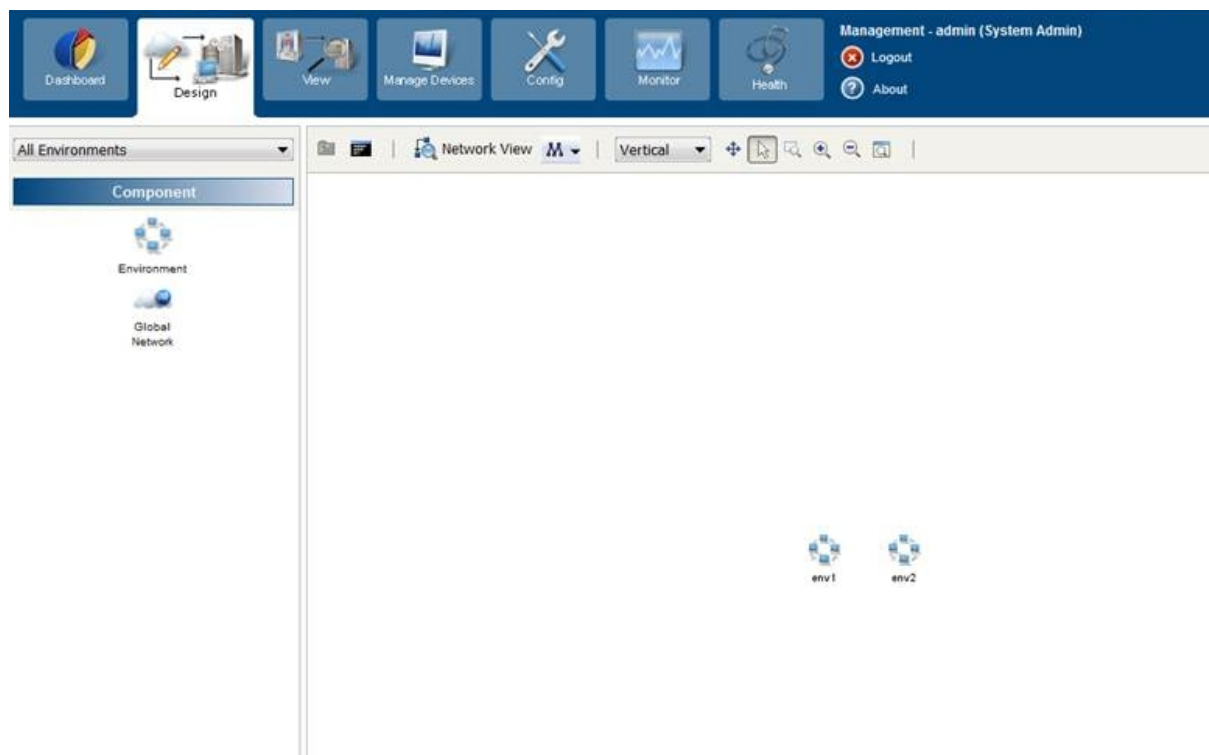


Figure 40: UFM Environment



Step 2: Add a logical server. UFM logical server is equivalent to datacenter cluster in the RHEV-M architecture model.

Select a Name and Description for this Logical Server Group

Name and Description

Allocation Method

Assigning Computers

Network Interfaces

Name: LS1

Description:

Environment: env2(0)

OS Type: Linux

Icon:

URL:

Event Script:

<< Previous Next>> Cancel

Figure 41: New Logical Server

Step 3: Add all hosts in the RHEV-M cluster.

Assign System Resources

Allocate free computes and click "Next"

Name and Description

Allocation Method

Assigning Computers

Network Interfaces

Filter: Name

	Name	ID	IP	CPU
<input type="checkbox"/>	hostname HCA-1	0002c9030008fb90	0.0.0.0	0
<input type="checkbox"/>	localhost HCA-1	0002c903002ee9e0	0.0.0.0	0
<input type="checkbox"/>	localhost HCA-1	0002c90300080c34	0.0.0.0	0
<input type="checkbox"/>	localhost HCA-1	0002c903004b51a8	0.0.0.0	0
<input checked="" type="checkbox"/>	xena006 HCA-1	0002c9030038d0d0	0.0.0.0	0
<input type="checkbox"/>	xena009 HCA-1	0002c903002e65d0	0.0.0.0	0
<input type="checkbox"/>	xena015 HCA-1	0002c90300455940	0.0.0.0	0
<input type="checkbox"/>	xena020 HCA-1	0002c903002ee400	0.0.0.0	0

<< Previous Next>> Cancel

Figure 42: Add Hosts



Step 4: Create a new network. Add partition key (PKey)

xena004.lab.mtl.com - New Network

General | QoS | Filter | IP Services

Environment: env2

Name:

Description:

PKey: ☒ Full ☐ Partial

Event Script:

IP Configuration

IP Subnet:

Network Mask:

Default Gateway:

OK Cancel Apply

Figure 43: Add Hosts



Step 5: Connect the logical server (cluster) to the network. By doing this, all hosts located under this logical server (cluster) will be connected.

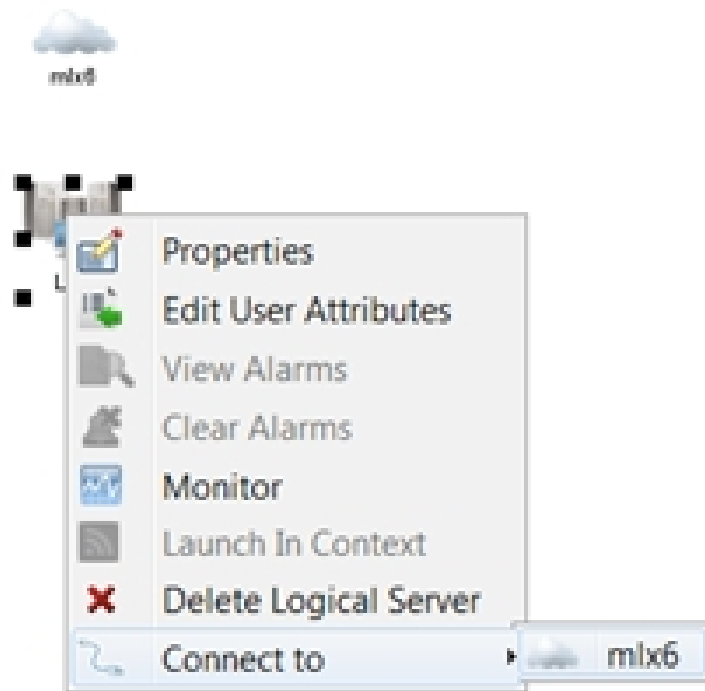


Figure 44: Connect the Logical Sever to the Network



Figure 45: UFM Network Connected to the UFM Logical Server

Refer to UFM User Manual⁶ for advanced configuration options.



6 Mellanox Network Manager Plugin

Mellanox Network Manager Plugin performs seamless integration between Mellanox UFM and the RHEV Manager. After installing the plugin, (see section 3.6 Mellanox Network Manager Plugin), the interconnectivity between the hosts in the network over eIPoIB interface is performed seamlessly.

For advanced configuration, please contact cloudsupport@mellanox.com.

7 Conclusion

The goal of this reference architecture is to provide general guidance and discuss the benefits of utilizing Mellanox Infiniband technologies within a Red Hat Enterprise Virtualization environment. Items covered were:

- Mellanox OFED driver installation
- Mellanox VSA installation
- Mellanox USM installation
- Installation and configuration of Mellanox Unified Fabric Manager
- Mellanox Network Manager Plugin installation and integration into UFM
- Configuration of Red Hat Enterprise Virtualization components for interconnect support
- Performance benefits

By combining Red Hat Enterprise Virtualization with Mellanox Infiniband technologies, customers can see benefits in performance while reducing expenditures related to traditional interconnect costs. The end result provides customers with a high speed, low latency solution laying the ground work for further Cloud integration as resources and demand increase.



Appendix A: Troubleshooting

A.1.1 Host is not Added to a Logical Server in UFM

Verify the server is visible in UFM. If it does not appear there, run:

```
#cat /sys/class/infiniband/mlx4_0/node_desc
```

The output should be something other than localhost HCA-1.

You can change it by running:

```
#echo "web1 HCA-1" > /sys/class/infiniband/mlx4_0/node_desc
```

A.1.2 Migration of VM Fails

Step 1: Check that libvirtd on the target is listening on TCP port.

```
# netstat -nap |grep libvirtd  
tcp        0      0 0.0.0.0:16509          0.0.0.0:*  
LISTEN     30771/libvirtd
```

Step 2: From the source, run:

```
#virsh -c qemu+tcp://target_host/system capabilities
```

Where target_host is the host name of the target.

The command should return without errors.

Step 3: Check that the file */etc/sysconfig/libvirtd* has the following lines:

```
LIBVIRT_ARGS=--listen  
DAEMON_COREFILE_LIMIT=unlimited
```

Step 4: Check that the port libvirtd uses is not blocked by a firewall.

A.1.3 Connection Verification of Virtual Machines Using eIPoIB

Verify the command `virsh list` runs without errors.

If you get a prompt for authentication, edit the file */etc/libvirt/libvirt.conf* by changing this line:

```
auth_unix_rw="sas1"
```

To:

```
auth_unix_rw="none"
```



A.1.4 Low Latency Performance Tuning

The below links provide a tactical tuning overview of Red Hat Enterprise Linux 6 for latency sensitive workloads and describes important tuning parameters and settings that can improve performance for Mellanox adapters. Each setting, along with its potential effect, is described to help in making an informed judgment concerning its relevance to the user's system, the system workload, and the performance goals.

- [Performance Tuning Guidelines for Mellanox Network Adapters](#)
- [Low Latency Performance Tuning Guide for Red Hat Enterprise Linux 6](#)

Appendix B: Related Documentation

For additional information, see the following documents:

Table 2: List of Related Documents

Document	Location
Red Hat Enterprise Virtualization 3.0 - Installation Guide	http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Virtualization/3.0/pdf/Installation_Guide/Red_Hat_Enterprise_Virtualization-3.0-Installation_Guide-en-US.pdf
Mellanox OFED User Manual	www.mellanox.com > Products > Adapter IB/VPI SW > Linux SW/Drivers http://www.mellanox.com/content/pages.php?pg=products_dyn&product_family=26&menu_section=34
Mellanox UFM User Manual	http://license1.mellanox.com
Mellanox VSA User Manual	http://license1.mellanox.com
Mellanox Cloud Interface plugin	Please contact: cloudsupport@mellanox.com
Low Latency Performance Tuning	https://access.redhat.com/knowledge/articles/221153

